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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,593	10/27/2003	Olaf Storbeck	L&L-10242	3503
24131	7590	05/11/2005	EXAMINER	
LERNER AND GREENBERG, PA			TOLEDO, FERNANDO L	
P O BOX 2480			ART UNIT	
HOLLYWOOD, FL 33022-2480			PAPER NUMBER	
			2823	

DATE MAILED: 05/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,593

Applicant(s)

STORBECK ET AL.

Examiner

Fernando L. Toledo

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20031027.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 4, 7, 9 – 12 and 14 – 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Akasaka et al. (U. S. Patent 6,162,741 A).

In re claim 1, Akasaka, in the U. S. Patent 6,162,741 A; figures 1A – 9 and related text, discloses a method for selectively oxidizing a metallization structure having at least one silicon layer 16 to be oxidized and at least one tungsten layer 18, which is not to be oxidized, which includes the steps of: performing a treatment step which includes subjecting the metallization structure to a mixture of hydrogen and water and supplying heat (Step 7; Figure 5); and subjecting the metallization structure to a nonaqueous hydrogen-containing substance, before the treatment step (Step 4; Figure 5).

3. In re claim 2, Akasaka discloses further including during a first section of treatment with the nonaqueous hydrogen-containing substance before the treatment step, setting a supply of the heat such that a temperature of the metallization structure is increased from a first temperature to a second temperature (Step 3; Figure 5).

Art Unit: 2823

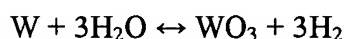
4. In re claim 3, Akasaka discloses further including during the treatment step, setting a supply of the heat such that a temperature of the metallization structure is increased from the second temperature to a third temperature (Step 5; Figure 5).

5. In re claim 4, Akasaka discloses further including setting the supply of the heat such that the temperature of the metallization structure is reduced continuously from the third temperature to the first temperature (Steps 8 and 9; Figure 5).

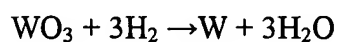
6. In re claim 7, Akasaka discloses further including setting the second temperature to lie in a range from 700°C – 900°C (Step 4; Figure 5).

7. In re claim 9, Akasaka discloses further including treating the metallization structure with an inert gas before and, optionally, after it has been subjected to the nonaqueous hydrogen-containing substance (Steps 3 and 5; Figure 5).

8. In re claim 10, Akasaka discloses further including during the treatment step, selecting a water content and a temperature such that in a pair of reaction equations



the reaction equation



has a greater reaction rate (Column 8, Lines 39 – 43).

9. In re claim 11, Akasaka discloses carrying out the performing and subjecting steps in a reaction chamber which has an inlet opening and an outlet opening; and disposing a substrate which includes the metallization structure in the reaction chamber such that the process gases can flow past the substrate from the inlet opening to the outlet opening (Figure 5).

Art Unit: 2823

10. In re claim 12, Akasaka discloses further including carrying out the subjecting and performing steps in a conditioning device (Figure 5).

11. In re claim 14, Akasaka discloses further including selecting one of pure hydrogen and a hydrogen/inert gas mixture as the nonaqueous hydrogen-containing substance (Figure 5).

12. In re claim 15, Akasaka discloses further including during the treatment step, setting a supply of the heat that a temperature of the metallization structure is increased from a defined temperature to a process temperature (Figure 5).

13. In re claim 16, Akasaka discloses further including setting the supply of the heat such that the temperature of the metallization structure is reduced continuously from the process temperature to a lower temperature (Figure 5).

14. In re claim 17, Akasaka discloses a method for selectively oxidizing a metallization structure being a gate structure having at least one polycrystalline silicon layer 16 to be oxidized and at least one tungsten layer 18 which is not to be oxidized, which includes the steps of: performing a treatment step which includes subjecting the metallization structure to a mixture of hydrogen and water and supplying heat (Step 7; Figure 5); and subjecting the metallization structure to a nonaqueous hydrogen-containing substance before the treatment step (Step 4; Figure 5).

15. In re claim 18, Akasaka discloses a method of fabricating a metallization structure having at least one silicon layer 16 and at least one tungsten layer 18, which includes the steps of: performing a treatment step which includes subjecting the metallization structure to a mixture of hydrogen and water and supplying heat (Step 7; Figure 5); and subjecting the metallization

Art Unit: 2823

structure to a nonaqueous hydrogen-containing substance before the treatment step (Step 4; Figure 5).

16. In re claim 19, Akasaka discloses a method for fabricating a gate structure of a MOS component having at least one polycrystalline silicon layer 16 and at least one tungsten layer 18, which includes the steps of: performing a treatment step which includes subjecting the gate structure to a mixture of hydrogen and water and supplying heat (Step 7; Figure 5); and subjecting the gate structure to a nonaqueous hydrogen-containing substance before the treatment step (Step 4; Figure 5).

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka as applied to claims 1 – 4, 7, 9 – 12 and 14 – 19 above.

In re claim 5, Akasaka discloses a water content of the mixture to be below 37% for a duration of the treatment step (Column 9, Lines 1 – 5). However, Akasaka does not disclose wherein the water content of the mixture is below 20%.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the water mixture at below 20%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or

Art Unit: 2823

workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Note that the specification contains no disclosure of either the critical nature of the claimed range or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen range or upon another variable recited in a claim, the Applicant must show that the chosen range is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). In addition, the selection of water mixture percentage, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

19. In re claim 6, Akasaka discloses wherein the first temperature is under 550°C. However, Akasaka does not disclose wherein the temperature is higher than room temperature but lower than 200°C.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the temperature higher than room temperature but lower than 200°C, since it has been held that where the general conditions of a claim are disclosed in the prior art,

Art Unit: 2823

discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Note that the specification contains no disclosure of either the critical nature of the claimed range or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen range or upon another variable recited in a claim, the Applicant must show that the chosen range is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). In addition, the selection of a temperature, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In *re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

20. Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka as applied to claims 1 – 4, 7, 9 – 12 and 14 – 19 above, and further in view of Wolf and Tauber.

In *re* claim 8, Akasaka discloses wherein at least during one section of the treatment step, setting a supply of the heat such that a temperature at or in an immediate vicinity of the metallization structure is in a range of 800°C.

Art Unit: 2823

However, Wolf and Tauber, in the textbook, VLSI for the Processing Era Volume 1: Process Technology discloses that at higher temperatures (900°C – 1100°C) the rate of oxidation is quicker exponentially (Table 4, page 208).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the structure of Akasaka at a temperature range of 900°C – 1100°C to form the silicon oxide layer in a fraction of the time.

21. In re claim 13, Akasaka does not disclose whether the conditioning device is a rapid thermal annealing device or a lamp-heated rapid thermal processing device.

However, Wolf and Tauber disclose that rapid thermal processing is useful to minimize dopant diffusion (page 57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the metallization structure of Akasaka in a rapid thermal annealing device, since, as taught by Wolf and Tauber, rapid thermal processing is useful to minimize dopant diffusion.

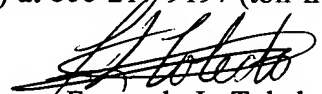
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 9am to 7:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Fernando L. Toledo
Examiner
Art Unit 2823

flt
9 May 2005